135.36
04/14/99
Rev. 03

NEW SITE IDENTIFICATION

Part A – To Be Completed By Observer	
1. Person Initiating Report: Lee Tuott	Phone: 526-7990
Contractor WAG Manager: Doug Kuhns	Phone: 526-8226
2. Site Title: Nitric Acid Contamination in Proximity to Group 1 Interim Action Trench Near CPP-604	

NEW SITE IDENTIFICATION

3. Describe the conditions that indicate a possible inactive or unreported waste site. Include location and description of suspicious condition, amount or extent of condition and date observed. A location map and/or diagram identifying the site against controlled survey points or global positioning system descriptors shall be included to help with the site visit. Include any known common names or location descriptors for the waste site.

This new site identification form describes the following:
1) the moist brown material discovered while excavating a trench for the Group 1 Tank Farm Interim Action drainage system and
2) elevated levels of radiological contamination discovered in soil while excavating the Group 1 Tank Farm drainage system lift station near the intersection of Olive Avenue and Beech Street.

1) Moist Brown Material (Nitric Acid Contamination) - While excavating a trench for the WAG 3 Group 1 Interim Action (Tank Farm drainage system), a moist brown material was discovered on 4/4/01. The location of this contamination and subsequent excavation associated with the search for the source is identified on the attached map. The area where the material was discovered is within CPP-58E, a CERCLA site that was contaminated from a 1976 release of PEW overheads resulting from a failure in a transfer pipe. PEW overheads consist of concentrated nitric acid and radionuclide constituents.

The material appeared to be slowly "seeping" into the north wall of the trench being excavated for the CERCLA Group 1 Interim Action for the Tank Farm drainage system. The top of the seepage/stained area was approximately 6 ft below ground surface, on the north trench wall and extended to the bottom of the trench at that time, a depth of approximately 7 ft. Preliminary sampling and characterization identified the material as being nitric acid, which exhibited low pH (2.41) and the presence of nitrates (3.67 mg/ml). Other contaminants included 0.639 mg/kg Hg and 6.98 pCi/g Cs-137. At the time of discovery, personnel were concerned that this may be an on-going release or a previously unidentified historical release because (a) it appeared to be "seeping" and (b) the source of this material was unknown. An attempt was made to trace this "seep" back to its source by excavating the areas having moist soil. However, the moist soils were removed without leading to the source of contamination. The extent of the area excavated was bounded by the utility tunnels on the south and east, to the building/utilities to the north, and to a long trench excavation to the west (part of the TFIA) (drawing entitled "INEEL OU 3-13 Group 1 Tank Farm Interim Action Nitric Acid Contamination Excavation"). In review of the excavation and drawings, the source of the contamination was not evident as no active nitric acid lines or known abandoned lines were in the immediate area. Furthermore, an assessment identified no other release from the active systems in the area that might contribute to this release of nitric acid. The nitric-acid-contaminated soils that were discovered are best described as a small area of moist nitric-acid-contaminated soils. To provide an indication of contamination remaining in the excavation after completion of the attempt to trace the seep, composite samples of the dry soils were taken and tested for pH. The results ranged from a pH of 1.9 to 8.7. No evidence of any further seepage was observed in the excavated area.

Because the source associated with this small area of nitric acid contamination could not be identified, this new site identification form (NSID) has been developed for consideration by the Agencies to clearly document this information and the conclusion that this contamination is part of the existing CPP-58E site.

2) Elevated Levels of Radiological Contamination - While excavating the lift station near the intersection of Olive Avenue and Beech Street, radiological contamination averaging 200-300 cpm up to a high of 500 cpm was encountered. The area of this excavation is to the south and west of the CERCLA site identified as CPP-58W in the FFA/CO Work Plan. The radiological control technician providing technical support for the project measured the highest level of contamination as 5,000 dpm, based on the 10% efficiency of the field meters. The 1993 Track 2 Summary report for this site stated that no further field investigation was performed for this site since the "contaminated soil at this site is located underneath an existing building and projected D&D will remove contamination prior to establishment of any residences." The WAG 3 ROD recognized that additional characterization of this Group 1 site is necessary and postponed the final remedial action selection decision. The ROD identified that additional site characterization, risk analysis, and remedial alternative evaluation will be performed in an OU 3-14 RI/FS for the Group 1 sites, including CPP-58. Due to the discovery of this radiological contamination, the boundary of CPP-58 has been revised on the attached map to include the area in the proximity of the lift station and the need to further investigate the extent of contamination in this larger area.

Path Forward for Items 1) and 2):
Item 1): In accordance with the guidance provided in Figure 5-1 of the Institutional Control Plan for the Idaho Nuclear Technology and Engineering Center, Waste Area Group 3, Operable Unit 3-13, this information is being submitted as part of a "new site identification" for consideration by the Agencies. As discussed with the Agency representatives, the area excavated to attempt to find the source of the nitric acid contamination will be filled in to allow completion of the drainage line for the Tank Farm Interim Action project. Prior to being filled in, the extent of the area excavated will be surveyed and the information recorded for evaluation during the OU 3-14 RI/FS. Item 2): The attached drawing, "INEEL OU 3-13 Group 1 Tank Farm Interim Action ECA CPP-58 Revised Boundary," depicts the two aforementioned areas where contamination was identified and the "expanded" exterior boundary of CPP-58.

Part B – To Be Completed By Contractor WAG Manager

4. Recommendation:

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☒ This site meets the requirements for an inactive waste site, requires investigation, and should be included in the INEEL FFA/CO Action Plan. Proposed Operable Unit assignment is recommended to be included in the FFA/CO.
WAG: 3
Operable Unit: 3-14, CPP 58.
Note: This action does not create a new CERCLA site since CPP-58 is an existing site identified in the FFA/CO Work Plan with a Track 2 investigation that was completed in November 1993. This action is providing additional information that will support the future OU 3-14 RI/FS investigation for this site.

☐ This site DOES NOT meet the requirements for an inactive waste site, DOES NOT require investigation and SHOULD NOT be included in the INEEL FFA/CO Action Plan.

5. Basis for the recommendation:

1) Moist Brown Material (Nitric Acid Contamination) - The unexpected nitric acid contamination that was discovered is consistent with the contaminants found in CPP-58 E, a site that was contaminated due to a release of PEW overheads. As part of the Track 2 Summary Report, two boreholes were drilled in CPP-58E: one near the release source (CPP-58E-1) and one located in the Group 1 excavation near where the "pocket" of nitric-acid-contaminated soil was discovered (CPP-58E-2). These boreholes were sampled to 46 ft bls. The results identified elevated levels of nitrates, mercury, Sr-90, and Cs-137. The elevated levels of Cs-137 were found at 14-16 ft bls and Sr-90 at 45 ft bls. The sampling performed during the investigation of the "pocket" of contamination identified a Cs-137 level of 6.98 pCi/g ±0.24. In review of the information, this contamination is part of the original CPP-58E release as evidenced from (1) the location with respect to release, (2) the same contaminants of concern, (3) the depth of contamination, and (4) no apparent ongoing release in the excavation following the removal of the moist soil. Based on these factors, further investigation of this contamination is appropriate as part of the OU 3-14 investigation that will be performed for CPP-58. As identified on the attached Table 4-1, OU 3-14 Tank Farm soil DQOs, from the Operable Unit 3-14 Tank Farm Soil and Groundwater Phase I Remedial Investigation/ Feasibility Study Work Plan, nitrates are identified as a known contaminant of Tank Farm soils. The nitrates are one of the non-radionuclide contaminants above risk based action levels and are identified as a COPC. As part of the OU 3–14 RI/FS activities, further investigation will be performed of the Tank Farm soil (includding CPP-58) through two field investigation phases (Phase I and Phase II) to develop alternatives for a final remedy. During this assessment, additional characterization will be performed of the release sites to fully characterize the contaminant source and the nature and extent of contamination.

2) Elevated Levels of Radiological Contamination - The attached drawing, "INEEL OU 3-13 Group 1 Tank Farm Interim Action ECA CPP-58 Revised Boundary," shows the area near the lift station where elevated levels of radiological contamination have been identified. As the OU 3-14 investigation will perform additional characterization of CPP-58 and other Group 1 sites, this effort should also evaluate the extent and levels of contamination in this area. The additional information will help with a more accurate characterization of this site during the development of the OU 3-14 RI/FS and will facilitate remediation decisions.

The basis for recommendation must include: (1) source description; (2) exposure pathways; (3) potential contaminants of concern; and (4) descriptions of interfaces with other programs, as applicable (e.g., D&D, Facility Operations, etc.)

6. Contractor WAG Manager Certification: I have examined the proposed site and the information submitted in this document and believe the information to be true, accurate, and complete. My recommendation is indicated in Section 4 above.

Name: Douglass J. Kuhns Signature: DJ Kuhns Date: 8-27-01

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NEW SITE IDENTIFICATION

Part C – To Be Completed By INEEL FFA/CO WAG Managers

7. WAG Operable Unit:

DOE WAG Manager's Concurrence: ☒ Concur with recommendation. ☐ Do not concur with the recommendation.

Signature: [signature]

Date: 9/6/01

EPA WAG Manager's Concurrence: ☒ Concur with recommendation. ☐ Do not concur with the recommendation.

Signature: [signature]

Date: 09/07/01

State of Idaho WAG Manager's Concurrence: ☒ Concur with recommendation. ☐ Do not concur with the recommendation.

Signature: [signature]

Date: 9-21-01

Explanation follows:

IDEQ further adds under Section 5.1) and 5.2) "The agencies will determine the necessary steps to further characterize this release site during the OU 3-14 Phase I or II investigation phases".

Part D – To Be Completed By The INEEL FFA/CO Responsible Program Managers (RPM's)

8. FFA/CO RPM's Concurrence:

For DOE-ID

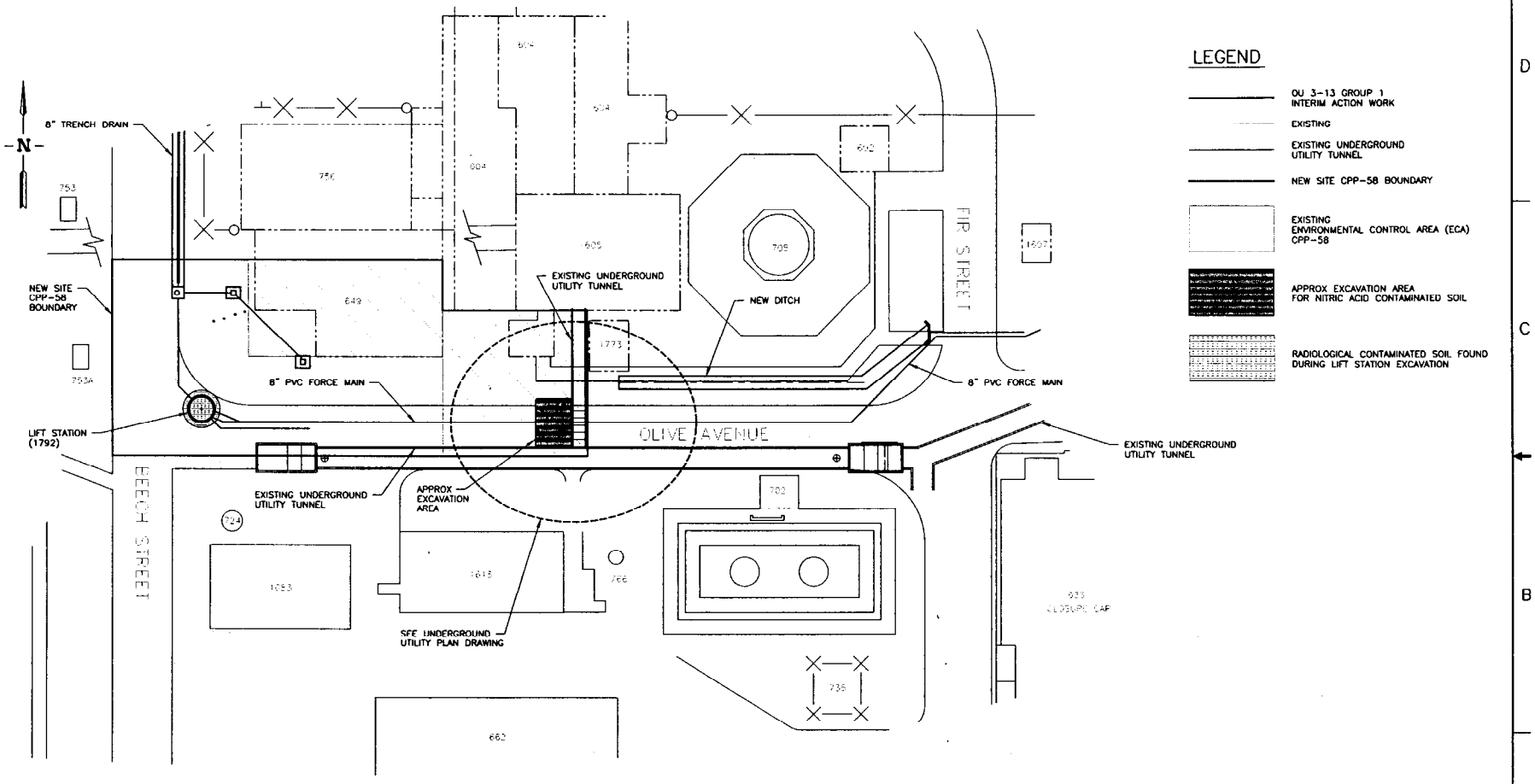
Name: Kathleen Hain Signature: [signature] Date: 1/08/2002 ☒ Concur ☐ Do not concur. Explanation follows:

For EPA Region X

Name: Wayne Pierre Signature: [signature] Date: 12/20/2001 ☒ Concur ☐ Do not concur. Explanation follows:

For State of Idaho

Name: Dean Nygard Signature: [signature] Date: 11/21/01 ☒ Concur ☐ Do not concur. Explanation follows:



AREA MAP
NOT TO SCALE

LEGEND

- OU 3-13 GROUP 1 INTERIM ACTION WORK
- EXISTING
- EXISTING UNDERGROUND UTILITY TUNNEL
- NEW SITE CPP-58 BOUNDARY
- EXISTING ENVIRONMENTAL CONTROL AREA (ECA) CPP-58
- APPROX EXCAVATION AREA FOR NITRIC ACID CONTAMINATED SOIL
- RADIOLOGICAL CONTAMINATED SOIL FOUND DURING LIFT STATION EXCAVATION

REVISIONS

REV.	DESCRIPTION	EFFECTIVE DATE

SUBCONTRACT NO.	S00-588051
REQUESTER:	M.S. KAPTEIN
DESIGN:	JESTIN HURST
DRAWN:	ROB HERGESHEIMER
PROJECT NO.	020978
SPEC CODE	
FOR REVIEW/APPROVAL SIGNATURES	
SEE DAR NO.	
EFFECTIVE DATE:	
DESIGN PHASE:	TITLE II
QUALITY LEVEL:	
SCALE:	NOTED

INEEL
INEEL
OU 3-13 GROUP 1
TANK FARM INTERIM ACTION
ECA CPP-58 REVISED BOUNDARY

SIZE	CAGE CODE	MDCI CODE NUMBER	DWG-	REV
D	01MF3	AREA | TYPE | SEQ | DISC 200 0100 01 090		

SHEET

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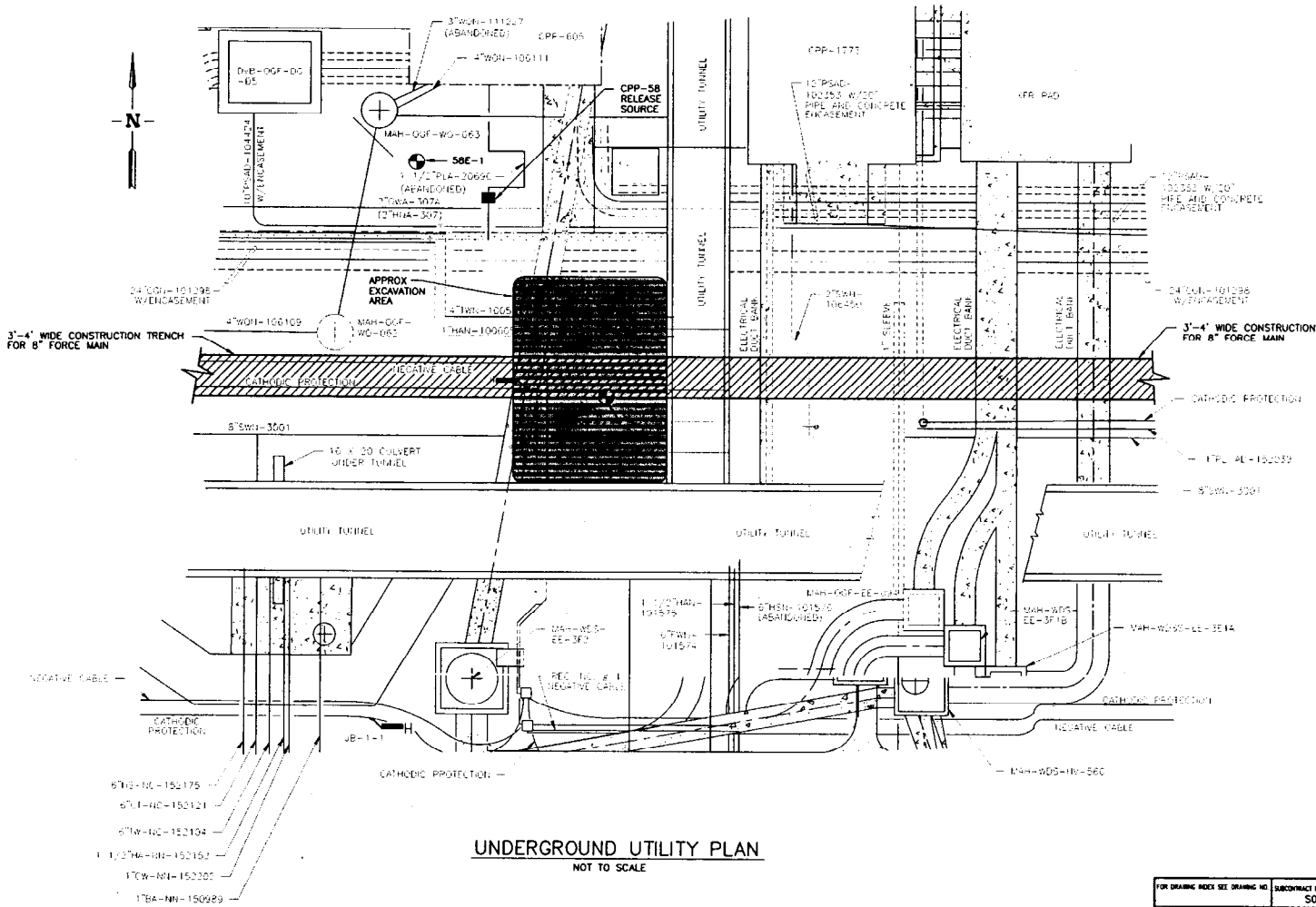
Layout Name: Layout1
Date: 09/24/01 - 10:06 AM



UNDERGROUND UTILITY PLAN

NOT TO SCALE

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE

FOR DRAWING INDEX SEE DRAWING NO.	SUBCONTRACT NO. S00-588051	INEEL
	REQUESTER M.S. KAPTEIN	
	DESIGN JESTIN HURST	
	DRAWN ROB HERGESHEIMER	
	PROJECT NO. 020978	
	SPEC CODE	
DESIGN PHASE:	FOR REVIEW/APPROVAL SIGNATURES	
QUALITY LEVEL:	SEE DAR NO.	
	EFFECTIVE DATE:	

INEEL
OU 3-13 GROUP 1
TANK FARM INTERIM ACTION
NITRIC ACID
CONTAMINATION EXCAVATION

SIZE	CAGE CODE	DRAWING NUMBER	REV
D		ANA TNF G DRC 200 0100 65 090 DWG-	

SCALE: NOTED SHEET

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Path: G:\OU3-13-TANKFARM\DGN
Layout Name: D Size
Date: 06/04/01 - 09:53 A.M.

Table 4-1. OU 3-14 Tank Farm soil DQOs.

1: State the Problem	2: Identify the Decision			3: Identify Inputs to the Decision	4: Define the Study Boundaries
Background: The Tank Farm soil has become contaminated by spills and pipeline leaks of radioactive liquids from plant and transfer operations. In addition to the known highly contaminated areas, low levels of contamination exist at varying locations and depths. Limited knowledge of the extent (both vertically and horizontally) of contamination, volume of spilled material, types of contaminants, and contamination levels is available because many of the spill sites are in operational and highly radioactive sites. The principal threats posed by contaminated Tank Farm soil is external exposure to radiation and leaching and transport of contaminants to the perched water SRPA where future groundwater users could consume contaminated SRPA groundwater. The Tank Farm soil are defined as the soil that exist from the surface down to the uppermost basalt flow and include release sites in OU 3-06, 3-07, 3-08, and 3-11. These sites are located within the Tank Farm boundary (Sites CPP-15, CPP -16, CPP-20, CPP-24, CPP-25, CPP-26, CPP-27, CPP-28, CPP -30, CPP-31, CPP-32, CPP-33, CPP-58, and CPP–79), cumulatively known as Site CPP-96. Contaminants of potential concern (OU 3-13 COPCs) evaluated in the OU 3-13 ROD or in the OU 3-13 RD/RA include: Am-241,Ce-144, Cs-134, Cs-137, Co-60, Eu-152, Eu-154, Np-237, Pu-238, Pu-239/240 , Pu-241, Pu-242, Ru-106, Sr-90, tritium, Tc-99, U-234, U-235, U-236, and zirconium. Known non-radionuclide contaminants include As, Cr, Hg (mercuric nitrate), nitrate (nitric acid), and thallium. The OU 3-13 ROD showed that Cs-137, Sr-90, and U-235 were a risk to human health. Volatile organic compounds and SVOCs were identified as COPCs for release Site CPP-15 during previous OU 3-08 Track 2 investigations (WINCO 1993b), but were screened out as not being a risk concern. Given the type of sampling technique being implemented for Phase I Characterization, it is not possible to sample for VOCs and SVOCs at CPP-15 in Phase I. The concern for VOC and SVOC contamination will be addressed as part of the Phase II Characterization Work Plan. A final CERCLA remedy for the Tank Farm soil release sites has been deferred pending further characterization and coordination of any proposed remedial actions with the Idaho HLW & FD EIS and RCRA closure of the tanks. A separate RI/FS, Proposed Plan, and ROD will be prepared for the Tank Farm soil under OU 3-14. Interim actions were evaluated under the OU 3-13 ROD to provide protection until a final remedy is developed and implemented. The DOE-ID, EPA, and the IDHW have determined that the OU 3-13 interim action will be protective of human health and the environment while the WAG 3 OU3-14 RI/FS is being performed and a final remedy is selected (DOE-ID 1999b). For convenience and to facilitate the Tank Farm soil investigations, the soil have been divided into three sections: 0 to 3 m (0 to 10 ft bgs), 3 to 13.7 m (10 to 45 ft bgs), and 0 to 13.7 m (0 to 45 ft bgs). The purpose for the divisions are described below. .3 m (0 to 10 ft bgs)—includes the Tank Farm soil near the surface that can reasonably be remediated 3 to 13.7 m (10 to 45 ft bgs)—these are the Tank Farm soil that may not be feasible to remediate due to underground tanks and pipes and high radiation levels 3–13.7 m (0 to 45 ft bgs)—these are the soil from which the total Tank Farm source will be determined. Because the Tank Farm is an operational facility, future leaks and spills are possible.	Success at meeting the remedial action objective will be determined by obtaining sufficient characterization data to develop a RI/FS, proposed plan, and ROD from which a remedial action can be selected that will prevent contaminants in the Tank Farm soil from being leached down to the perched water and possibly contaminating the SRPA.				This study focuses on sufficiently characterizing the Tank Farm soil to understand the contamination types, levels, and distribution and the risks associated with the contamination, the areal hydrology, and the geochemistry for the purpose of identifying effective remedial actions for the OU3-14 RI/FS, proposed plan, and ROD. Specifically included in this study is the contamination in the surface soil (from the surface to top of basalt) at the Tank Farm. The physical boundaries of the study are the Tank Farm area known as Site CPP-96. Site CPP-96 includes CPP-15, CPP-16, CPP-20, CPP-24, CPP-25, CPP-26, CPP-27, CPP-28, CPP-30, CPP-31, CPP-32, CPP-33, CPP-58 and CPP–79. These are all the sites within the Tank Farm or adjacent to the PEW evaporator building. The boundary is defined in the OU 3-14 Scope of Work (DOE-ID 1999a). At depth, the boundaries of the study area are from the surface to the top of basalt. This depth varies with location but averages about 13.7 m (45 ft). OU 3-14 Characterization Investigation activities: • Field Investigation Phase I • Field Investigation Phase II • Contaminant Transport and Treatability Studies • Risk Assessment and Groundwater Modeling • RI/FS Report • OU 3-14 ROD Preparation The Post-ROD OU 3-14 Tank Farm remedial activities are anticipated to be undertaken in four stages timed to accommodate facility RCRA closure. Boundaries on the stages are shown below. • Stage I: Moisture monitoring and control • Stage II: Address immediate threats during Tank Farm operations and RCRA closure of some high level waste tanks • Stage III: Begin remediation of post-RCRA closure of the high level waste tanks but before D&D&D of the surrounding area and buildings • Stage IV: Final remedy for the Tank Farm area after all INTEC D&D&D activities are complete. Site characterization is anticipated to be initiated in two phases. In addition to the physical and time boundaries, shown above, other boundaries (listed below) could possibly impact the project. *Schedule boundaries*: The schedule may be impacted by the budget allotted for the remedial action. Any loss in the budget without adjustment in scope will extend the schedule. That action may adversely impact the mitigation of the transport of contaminants to the SRPA. *Budget boundaries:* The budget is anticipated to remain at a constant funding level during the course of the investigation. This will require that remedial actions be optimized not only technically but also financially.
	Principal Study Questions	Alternative Actions	Decision Statement		
	PSQ-1a: What is the number and spatial extent of the high contamination zones in the 0 to 3 m (0 to 10-ft) depth range? (This is required for evaluation of the residential and external risk and possible remedial alternatives.)	A: High-resolution data that are needed for evaluation of the external risk and remedial alternatives are available and sufficient to identify affected soil, soil volumes, and concentration levels of contaminated soil for major release sites in the 0 to 10-ft depth at the Tank Farm. Proceed with data collection. (No consequence is associated with this alternative.) B: Insufficient data or data without high resolution are available and add uncertainty to the identification and quantification of the major Tank Farm high-contamination areas. Proceed with gathering more information to make decision. (The consequence of this alternative is that additional information will be required in order to evaluate remedial technology.)	DS-1a: Determine whether the field screening methods have successfully identified all high contamination sites (16 to 23 pCi/g for Cs-137) in the Tank Farm soil 0 to 3 m (0 to 10 ft bgs) with a volume of ≤ 70 $ft^3$of soil surrounding the probe hole. This information drives the evaluation of remedial technology and design.	Inputs to the PSQ-1a decision include: Historical records Process knowledge Gamma survey data Neutron survey data Nuclear constants Ratio estimation Soil analytical results	
	PSQ-1b: What is the number and spatial extent of the high contamination zones in the 0 to 13.7 m (0 to 45-ft) depth range? (This is required for the evaluation of groundwater risk and possible remedial alternatives.)	A: High resolution data that are needed for evaluation of the external risk and remedial alternatives are available and sufficient to identify affected soil, soil volumes, waste types, and concentration levels of contaminated soil for major release sites in the 0 to 45 ft depths at the Tank Farm. Calculate a source term for the Tank Farm soil. Proceed with further characterization. (No consequence is associated with this alternative.) B: Insufficient data or data without high resolution are available and add uncertainty to the identification and quantification of the major Tank Farm high contamination areas. Conduct additional data collection. (The consequence of this alternative is that additional information will be required in order to evaluate remedial technology.)	DS-1b: Determine whether the field-screening methods have successfully identified all high-contamination sites (16 to 23 pCi/g for Cs-137) from 0 to 13.7 m (0 to 45 ft bgs) in the Tank Farm soil with a volume ≤ 70 ft^3 of soil surrounding the probe hole. This information drives the evaluation of remedial technology and design.	Inputs to the PSQ-1b decision include: Historical records Process knowledge Gamma survey data Neutron survey data Nuclear constants Ratio estimation Soil analytical results	
	PSQ-2a: What are the radionuclide contaminants in each of the high contamination zones (from 0 to 13.7 m [0 to 45 ft bgs])?	A: The contaminants currently identified are the only radionuclides that are present in the Tank Farm soil that are above risk based action levels (OU 3-13 COPCs) and are a potential threat to the SRPA. Proceed with remedial investigation. (No consequence is associated with this alternative.) B: Other radionuclide contamination, in addition to the OU 3-13 COPCs, are present that are above risk based action levels and could potentially pose a threat to the SRPA. Evaluate all OU 3-14 COPCs to determine contaminated soil volumes, waste types, Tank Farm soil source term, etc. and to determine the appropriate remedial actions. (The consequence of this alternative is that all of the OU 3-14 COPCs need to be identified in order for remedial actions to address them.)	DS-2a: Determine whether additional radionuclides in either the soil or soil-pore water are present at concentration levels greater than risk action levels. If so, they will become OU 3-14 COPCs.	Inputs to the PSQ-2a decision include Historical records Soil analytical data Soil-pore water analytical data Field screening data Risk analysis results Model predictions Hydraulic properties K_d data	
	PSQ-2b: Are there non-radionuclide contaminants present in the Tank Farm soil from 0 to 45 ft bgs (in addition to those currently identified)?	A: Mercury, chromium, arsenic, thallium, and nitrates are the only non-radionuclide contaminants in the Tank Farm soil that are above risk based action levels and are identified as OU 3-14 COPCs. Proceed with remedial investigation. (No consequence is associated with this alternative.) B: Data suggests that other non-radioactive contaminants may become OU 3-14 COPCs. Evaluate all OU 3-14 COPCs to determine contaminated soil volumes, waste types, Tank Farm soil source term, etc. and for appropriate remedial actions. (The consequence of this alternative is that all of the OU 3-14 COPCs need to be identified in order for remedial actions to address them.)	DS-2b: Determine whether additional non-radionuclide contaminants are identified in concentrations above risk-based action levels. If so, they will be added to the OU 3-14 COPC list for the Tank Farm soil.	Inputs to the PSQ-2b include Historical records Process knowledge Soil analytical data Soil-pore water analytical data Field screening data Risk analysis results Model predictions Hydraulic properties K_d data	
	PSQ-3: What is the extent of the mobility of each of the contaminants within each of the identified soil matrices??	A: Contaminants are strongly sorbed to the Tank Farm soil. Proceed with remedial investigation. (No consequence.) B: Contaminants are mobile and are being or potentially can be leached out of the Tank Farm soil. Evaluate the threat and possible need of immediate and appropriate remedial actions. (The consequence is that immediate remediation may be required.)	DS-3: Determine whether contaminants are being transported out of the Tank Farm soil.	Inputs to the PSQ-3 decision include: Analytical concentration data Selected soil extractions (leach and absorption studies) K_d data Site-specific geochemistry Model predictions Hydraulic properties	
	PSQ-4a: What is the vertical moisture flux moving from the Tank Farm soil into the basalt?	A: Moisture data indicate there is insignificant flux through the Tank Farm soil to transport contaminants into the basalt, into the perched water and potentially to the SRPA. Proceed with remedial investigation. (No consequence is associated with this alternative.) B: Moisture data indicate that there is enough flux moving through the Tank Farm to transport contaminants to the perched water and potentially to the SRPA. Evaluate for possible Stage II actions. (The consequence is that if there is significant OU 3-14 COPC flux, immediate remediation may be required.).	DS-4a: Determine whether the flux out of the soil is stopped by the interim actions. (An additional benefit of moisture characterization may be the identification of major recharge sources.)	Inputs to the PSQ-4a decision include: Moisture data Matric potential data Contaminant concentrations Model predictions Hydraulic property data Recharge sources	
	PSQ-4b: What is the horizontal moisture flux into the Tank Farm soil?	A: Data indicate there is little moisture moving into the Tank Farm soil horizontally. Proceed with remedial investigation. (No consequence is associated with this alternative.) B: Moisture data indicates that a significant lateral flux exists in the Tank Farm soil. Evaluate for possible Stage II actions and proceed with investigation. (The consequence is that if moisture is moving laterally, immediate remedial actions may be required and lateral flux will be a necessary consideration for long-term remedial actions.).	DS-4b: Determine whether moisture is moving into the Tank Farm soil (under the temporary cover) from areas outside the Tank Farm.	Inputs to the PSQ-4b decision include: Moisture data Matric potential data Contaminant concentration data Model predictions Hydraulic property data Recharge source K_d data	

Table 4-1. (continued).

1: State the Problem	2: Identify the Decision		3: Identify Inputs to the Decision	4: Define the Study Boundaries
Problem Statement: The Tank Farm soil is known to be contaminated from historical spills and releases. Information from previous investigations about the nature and extent of the Tank Farm soil contamination is incomplete. The size, location, contaminant type, dose rate, source term, and OU 3-14 COPC (OU 3-14 Remedial Investigation determination) migration probability from the site need to be clarified for future remedial actions. The moisture content, contaminant flux out of the Tank Farm soil, and physical, hydraulic, and geochemical soil parameters are required.	PSQ-5 Based upon new data obtained during evaluation of the Tank Farm high contamination zones and soil moisture, what are the best final remedial approaches?	A: Data are sufficient to characterize the Tank Farm soil, write a RI/FS, and develop appropriate remedial alternatives. Proceed with remedial technology evaluation. (No consequence.) B: There is still too much uncertainty to develop an RI/FS or suggest appropriate remedial actions. Conduct further investigations until understanding is sufficient to recommend appropriate remedial technology. (The consequence is that more data will be required.)	DS-5: The recommended remedial action will be based on hydraulic, geochemical, and physical drivers; the success of the interim actions; and the comparison of the identified requirements, associated technologies, and their cost.	Inputs to the PSQ-5 decision include: Final OU 3-14 Tank Farm soil COPC list Concentration levels Contaminant flux Number of high contamination zones Waste volume Tank heels Recharge water/sources Site-specific geochemistry data Deep drainage Hydraulic properties Model predictions Waste types (TRU, RCRA, characteristic, TSCA, mixed, etc.) Remedial cost Impracticability of technology Technical feasibility of remediation technology Maturity of technology Efficacy of technology Source term for Tank Farm soil Source term for Tank Farm soil and closed tanks	*Moisture boundaries:* Moisture boundaries with the potential to impact the OU 3-14 investigation and remediation are only on the high side. Saturated moisture conditions mandate immediate action. The soil cannot become too dry. *Concentration boundaries:* These boundaries result from contaminant concentrations. For radionuclide concentrations the boundaries extend from low concentrations to the risk-based action levels agreed to in the OU 3-13 ROD. A high dose rate could drive remote remedial methods. Other remedial considerations related to concentration levels include upper inventory levels of possible waste disposal facilities. Metals concentration levels should not impact remedial activities. Should high VOC levels be present, some remedial activities could be affected, e.g., grout and thermal processes. *Operational boundaries:* The remediation of the Tank Farm soil will occur in stages (shown above) to cooperate and not interfere with operational activities. Activities in each stage of remediation could be impacted by ongoing operations. *Treatment evaluation boundaries:* The evaluation of remedial technologies may potentially be impacted by a variety of laboratory-related influences including scale, contamination levels, and heterogeneity. It may also be impacted by the implementability of the treatment. *Integration boundaries:* Final remediation may be impacted by the integration of any or all of the above boundaries.

Table 4-1. (continued).

5: Develop a Decision Rule	6: Specify Tolerable Limits on Decision Errors	7: Optimize the Design
DR-1a: If high resolution data are available and sufficient to identify affected soil, soil volumes, and concentration levels of contaminated soil for all major release sites in the 0 to 3 m (0 to 10-ft) depths at the Tank Farm then proceed with Alternative A. If not, proceed with Alternative B.	Data collected to determine whether additional contaminants in the Tank Farm soil are at concentration levels equal to or greater than risk-based action levels (DS-2a and DS-2b) are amenable to statistically based limits on decision errors. Hypothesis testing will be utilized to determine if action levels are exceeded to resolve Principal Study Questions 2a and 2b (PSQ-2a and PSQ-2b). The null hypothesis, H_0, is that the true mean of a contaminant is greater are clear al to the risk-based action level. The alternative is that the true mean is less than the risk-based action level. H_0: $\mu \geq$ action level H_a: $\mu <$ action level The hypothesis testing will be performed to a level of significance, α, of 0.05. In other words, with this level of significance, we limit the probability of a Type I error, or of rejecting the null hypothesis when it is true, to 5%. The hypothesis testing is designed to allow us to control the probability or erroneously concluding that action levels are not exceeded when in fact they are exceeded. The null hypothesis was formulated based upon the belief that the harmful consequences of incorrectly concluding that an action level is not exceeded when it actually is exceeded outweigh the consequences of incorrectly concluding that the action level is exceeded when in fact it is not. Statistically based decision errors are not appropriate for the other decision statements.	The information necessary to evaluate remedial alternatives and develop the feasibility study will be obtained from the site characterization and, if deemed necessary, treatability and contaminant transport studies. A final decision will be made in the OU 3-14 ROD. It is envisioned that four stages of Post-OU 3-14 ROD remedial activities will occur. Stage I. Activities included in Stage I will focus on moisture monitoring and control. It is during this stage that the Phase I characterization activities will occur, in addition to the OU 3-13 Tank Farm Interim Action. Phase I activities include: the surface geophysics/gamma surveys, installation of the probeholes, gamma loggir g of the probeholes, and direct sampling of selected vacuumed soil stored in drums from the probehole installation activities. Technical papers to be prepared during Phase I include: Phase I data summary report and a remedial alternative screening report. Stage II. During Stage II immediate threats during Tank Farm operations and RCRA closure of some high level waste tanks will be addressed. During this stage, Phase II characterization will be implemented, along with continuing the OU 3-13 Tank Farm Interim Action. Phase II involves conducting a more detailed soil gamma survey, and potentially collecting soil samples from specific areas, i.e., hot spots, to characterize contaminants, waste types, and source terms. This would involve the installation of large-diameter probe holes and moisture monitoring stations, initiation of moisture monitoring, and contaminant mobility studies. If deemed necessary, treatability studies may also be initiated during this phase, which would evaluate in situ stabilization, grouting, and other technologies that are under consideration. Technical papers to be prepared during Phase II include: Phase II data summary report, contaminant transport study report, risk assessment strategy, groundwater strategy, conceptual model report, RI/BRA report, treatability study report (if treatability studies are performed), and a feasibility study report. Stage III. During Stage III, remediation of post-RCRA closure of the high-level waste-tanks will began, in addition to continuing the OU 3-13 Tank Farm Interim Action. This stage will occur before D&D&D of the surrounding area and buildings. Stage IV. Activities in Stage IV include the final remedy (compatible with the OU 3-13 Tank Farm Interim Action) for the Tank Farm area after all INTEC D&D&D activities are complete.
DR-1b: If high resolution data are available and sufficient to identify affected soil, soil volumes, waste types, and concentration levels of contaminated soil for major release sites in the 0 to 13.7 m (0 to 45-ft) depths at Tank Farm, proceed with Alternative A. If not, proceed with Alternative B.		
DR-2a: If contaminants currently identified are the only radionuclides that are present in the Tank Farm soil that are above risk based action levels and are a potential threat to the SRPA, proceed with Alternative A. Otherwise proceed with Alternative B.		
DR-2b: If Hg, Cr, As, and nitrates are the only non-radionculide contaminants in the Tank Farm soil that are above risk based action levels and are identified as OU 3-14 COPCs, then proceed with Alternative A. Otherwise, proceed with Alternative B.		
DR-3: If contaminants are strongly sorbed to the Tank Farm soil, then proceed with Alternative A. Otherwise, proceed with Alternative B.		
DR-4a: If moisture data indicate there is insignificant flux through the Tank Farm soil to transport contaminants down to the perched water and potentially to the SRPA, then proceed with Alternative A. Otherwise, proceed with Alternative B.		
DR-4b: If data indicates there is not significant moisture moving into the Tank Farm soil laterally, then proceed with Alternative A. Otherwise, proceed with Alternative B.		
DR-5: If there is enough data to characterize the Tank Farm soil, write a RI/FS, and develop appropriate remedial alternatives, then proceed with Alternative A. Otherwise, proceed with Alternative B.		